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# Effects of Audible Human Disturbances on Koala (Phascolarctos Cinereus) Behavior in Queensland, Australia and Implications for Management

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# Effects of Audible Human Disturbances on Koala (Phascolarctos Cinereus) Behavior in Queensland, Australia and Implications for Management

—Galina Kinsella (Editor: Moira Wright)

As a senior in the medical and veterinary option of the biomedical sciences major, it's no secret that I have a love for animals. I have taken every opportunity I can to work with them, whether it be an internship at a zoo or a veterinary clinic. As a child, I was enthralled by *Animal Planet's* episodes of *The Crocodile Hunter*, where host Steve Irwin ventured into the Australian wilderness to seek out rare and dangerous creatures in order to educate the public about them. It was my dream to do what he did for a living, and though I have always strived to be a veterinarian, I didn't think going on adventures like his was possible.

When I learned about the Summer Undergraduate Research Fellowship (SURF) Abroad program at the University of New Hampshire (UNH), it hit me: it was possible for me to go on the adventure of a lifetime while preparing for a future in veterinary medicine where I could venture into the wilderness as part of my job. I contacted many different wildlife research centers in Australia, and Dr. Alistair Melzer of the Koala Research Center agreed to be my foreign mentor. I chose Dr. Drew Conroy to be my UNH mentor because of his experience with research abroad (in Africa), and because I've taken many classes with him.

*The author cuddles a koala at a wildlife rehabilitation center/petting zoo in Queensland.*

With the grant and thirteen weeks in Australia during the summer of 2014, I was able to accomplish my goals of working abroad and of doing valuable research on a declining species: the koala. My research was on koalas' responses to audible disturbances, whose sources were principally human or human-related, and the resulting effects on their health.

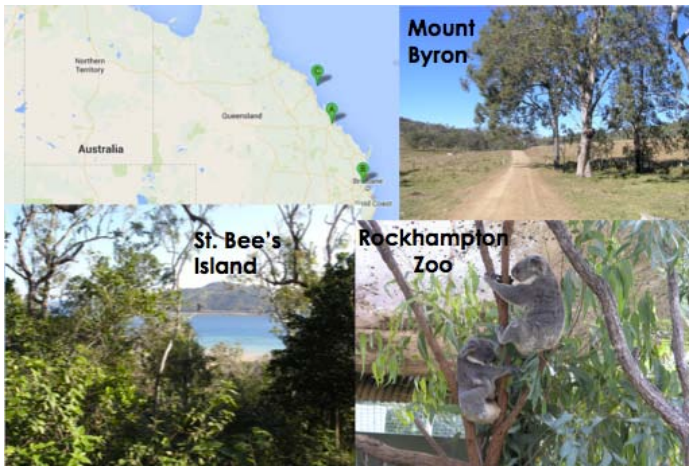
While in Australia, I lived in Rockhampton, Queensland, which is about a seven hour drive north of Brisbane, the capital of Queensland. I lived in the Central Queensland University student residences, so it was similar to living in a dorm at UNH. I had a desk at the Central Queensland Innovation and Research Precinct (CQIRP) at the university. This is where I did my data entry and where Dr. Melzer's office is located. Dr. Melzer coordinates the work of university and volunteer field researchers for the Koala Research Center.

## All About Koalas

Koalas are arboreal marsupials; they are actually not bears, although they do resemble small bear cubs. Allegedly, A.A. Milne modeled his famous character Winnie the Pooh on the koala (Martin and

Handasyde 1999). The closest relative to the koala is the wombat, a terrestrial marsupial. Koalas spend approximately twenty hours a day resting or sleeping because their diet, which consists exclusively of eucalyptus leaves, is low in nutrients and slightly toxic. In order to survive on this diet, koalas spend the time resting in order for their hindgut to be able to ferment and digest the leaves. Koalas are currently listed as “vulnerable” on the endangered species list, but many wildlife biologists believe a classification of “endangered” (the next up on the conservation status list, created by the International Union for the Conservation of Nature) would be more accurate. Over the past twenty years, koala population numbers have dropped forty percent in Queensland, and by a third in New South Wales (ABC Science 2012).

The three major causes of mortality in koalas are vehicle accidents, domestic dog attacks, and disease. Studies have shown that increased stress causes a suppressed immune system, which makes koalas more susceptible to diseases like Chlamydia and retrovirus (Canfield et al 2008). I observed the koalas’ responses to audible disturbances, in particular human or human-related. Frequent responses to these disturbances meant that the koalas were altering their natural behavior and therefore, their activity cycles. If the koala was attentive to the disturbances, it was losing sleep. Just like college students, less sleep means increased stress and a suppressed immune system.




*Queensland and the practice and study sites.*

Before I began my studies on wild koalas, I did a brief practice study on the koalas at the Rockhampton Zoo. I used the same methods of observation and recording as I did in the wild studies. However, I did not include this data in my final analysis, as there were too many factors that could not be controlled. The fact that captive koalas may behave differently than wild koalas also influenced my decision to not include the zoo data.

I had two study sites with wild koalas. The first was at Mount Byron, a rural farmland area an eight-hour drive south of Rockhampton. Trees were sparse in much of it due to cattle pastures. This area served as a developed, or “disturbed,” area because of human influence on the land. The second site was St. Bee’s Island, a protected national park with no human developments, a four-hour drive north of Rockhampton. There were no paths and the undergrowth was thick; therefore, this was my “undisturbed” site.

## In the Field

At both research sites, I was accompanied by my mentor, Dr. Melzer. Upon arrival at the sites, he familiarized me with any safety hazards present and advised me on how to navigate through the area. Often other researchers were present working on their projects. For example, at St. Bee’s Island, researchers from the National Parks Department were with us for a few days, taking vegetation samples. Both sites were populated by koalas that had been radio-collared previously by researchers from the University of Queensland. Before we arrived at the research sites, Dr. Melzer taught me how to use the radio-tracking equipment. The researchers provided me with the frequencies that each koala’s collar transmitted on. At the research site, I entered the list of frequencies into my radio receiver, and then searched for each one individually by walking around holding the antenna and listening for audible responses.

At Mount Byron, I stayed at the Hollow Log Country Retreat, a small cabin on a farm, with Dr. Melzer and several other field biologists. I spent a collective ten days at this site, spanning two trips. When working at St. Bee's Island for ten days, we stayed on a neighboring island, since St. Bee's does not have camping areas, and commuted by small boat. On St. Bee's, the radio-tracking equipment died on the first day, so I had to find koalas without the equipment. Dr. Melzer assisted me and we successfully searched looking for the koalas' feces and the scratch marks they left on trees.

Once I located a koala, I found a spot to sit where it could not see me and remained quiet so that it could not hear me. I waited fifteen minutes after I sat down to start the observations, in order to allow the koala to acclimate to my presence if it had noticed me. I wrote down any disturbances I heard, such as wallabies hopping around or an airplane passing over. I wrote down the type of disturbance, the time it occurred, and how the koala reacted, if it reacted at all. Reactions included anything from the koala opening its eyes to moving to another tree. If the koala moved to another tree during observation and was still visible, I found another suitable spot to continue observing it.

*The author with a radio antenna searching for a koala.*

Travelling to and from the sites and making observations proved to have hazards I would have never expected had I been in America. When arriving daily at St. Bee's Island, we had to wade from the boat into shore. On this walk through the water, I encountered sting rays, stonefish, and cone shells, all of which can do significant harm to people. I remember shuffling my feet as I walked to alert the sting rays, and often looking down to see one swimming away right in front of me. While on St. Bee's, I encountered green ants, whose bite was unforgettable, to say the least. Sometimes I would be walking down a steep incline, slip, grab a branch for support only to discover it was crawling with green ants. Between them and the spiders, I would have an array of bites on my body by the end of the day. While observing at Mount Byron, there were certainly fewer encounters with wild animals, as the terrain was mostly developed into farmland. However, sitting in the grass there, I had a close encounter with an Eastern Brown Snake, whose bite can be deadly.

## Observations and Results

I observed a total of nineteen koalas: ten at St. Bee's Island and nine at Mount Byron. The sites differed in the number and kinds of audible human and animal disturbances noted. I grouped the disturbances into four different categories. The "human" category included disturbances such as radio noise and people walking or talking. The "vehicle" category included any vehicle noise. The "mechanical" category included anything from airplane noise to motorboat engine noise. The "animal" category included anything from wallabies to another koala.

The average number of disturbances that occurred per day was 78.8 at Mount Byron. The top three most frequent disturbances were airplane noise, vehicle noise, and people talking and walking. At St. Bee's, as might be expected, the daily average was lower at 23.5, and the top three disturbances were radio noise, airplane noise, and either human or animal movement in the grass.

When watching a koala, I ranked its responses to disturbances as follows: no response, minimal, moderate, and maximal. Minimal meant a small response such as an ear twitch; moderate meant the koala moved its arms or changed position; and maximal meant the koala moved to another tree or vocalized (made sounds similar to those of a wild boar). At Mount Byron, the koalas responded 59.6% of the time to a disturbance. Their average response was moderate. The most energetic responses were

due to koala interactions. In contrast, koalas at St. Bee's Island responded to disturbances only 29.4% of the time, and their average response was minimal.

In all my observations, responses were never extreme enough to be termed avoidance responses, such as fleeing. Koalas use cryptic behavior, or camouflage, as a form of defense. Their shape and coloring makes them hard to see if they are immobile among the leaves. Koalas have a darker coloration on the top of their bodies and a lighter coloration beneath. Thus, for a predator in the sky, the koala would blend in with the ground. From the ground, the koala would blend in with the sky and clouds.

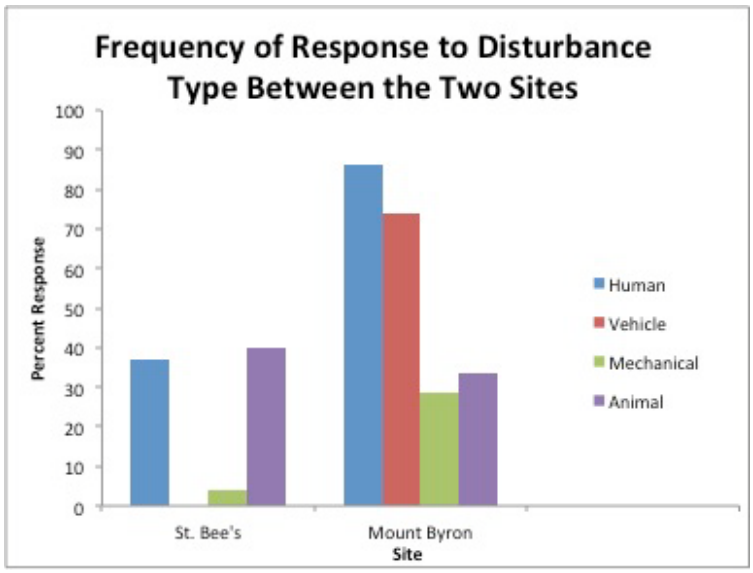



*Figure 1: This graph shows the percent of times a koala responded in any way to a type of disturbance.*

My data shows that, where disturbances are few (St. Bee's Island), the koalas respond less frequently to them and less strongly, than at a more disturbed (by humans) site like Mount Byron, where they respond more frequently and more strongly. (See Fig. 1) Frequent disturbances cause more responses from the koalas, which means they are getting less of the sleep they need to digest their diet of eucalyptus leaves and remain healthy. Even a small interruption in their sleep pattern could compromise their immune system and make them more susceptible to disease. This is why it is important to monitor their stress levels.

There was a high response rate to vehicles at Mt. Byron, but the responses were minimal to moderate in all cases. The only category where koalas on St. Bee's (the less disturbed site) showed a slightly higher response rate was animal. This was an interesting result, and it could be hypothesized that St. Bee's koalas recognized potential danger in animal sounds and would react to them, whereas human disturbances did not have the same association with danger.

This data demonstrated that in a less disturbed environment, koalas are less likely to react when a disturbance does occur. This is key in understanding their population dynamics, because increased stress levels mean a suppressed immune system, making the animal more susceptible to Chlamydia, one of the main causes of mortality in the koala (Flint and Melzer 2013). If I had spent more time in Australia, I would have liked to look at disease rates at both sites and compare them to the disturbance levels I measured, in order to identify a relationship.

## An Indescribable Experience

The worst part about returning to the United States and UNH was running into people and having them casually ask, "How was Australia?" I couldn't sum up this experience even if I wrote a long memoir. As far as my research went, I gained a wealth of knowledge about wildlife conservation and animal behavior, which is a field I hope to work in as a veterinarian. However, it was one thing for me to say I wanted to be a wildlife veterinarian while watching *The Crocodile Hunter*, sitting comfortably on my couch at home. It's another thing all together to be able still to say it after trekking through spider and green ant infested trails and getting cut up by thorns along the way, all to find a koala. Field work was very hard work, especially in an environment I was not familiar with. Although there were some days I wished I was home, with all

the comforts of the indoors, I wouldn't trade this experience for the world. For every green ant attack, I was able to see koalas and other animals in their natural habitat. Those experiences, along with seeing the myriad of problems facing endangered species, make me all the more passionate about making a difference in wildlife conservation.

In addition to aiding my future career endeavors, this experience has given me a global perspective. Living in another country and conducting my own research, without the aid of a study abroad program or fellow American students, gave me a sense of independence I had yet to experience. Despite being an English-speaking country, Australia has a very unique culture. I believe I've gained a deeper sense of appreciation for other cultures, and my desire to travel has been increased exponentially. This summer made me realize that I'm capable of amazing things that I thought I could only dream about, as long as I put my mind to them.

*There are many people I have to thank for this once in a lifetime experience. Funding for this trip was made possible by donors Mr. Dana Hamel, Mrs. Joan Savage, and the Cogswell Endowment. I so appreciate all their generosity. A big thank you goes to Dr. Georgeann Murphy, Mr. Peter Akerman, and Dr. Paul Tsang of the Hamel Center for Undergraduate Research for supporting me and making me believe that I was capable of this undertaking. My mentors were incredible throughout this journey, teaching me more than I could ever possibly learn in a classroom. So thank you to Dr. Drew Conroy and Dr. Alistair Melzer. Without their enthusiasm and charisma, this experience wouldn't have been nearly as enjoyable or memorable. Lastly, I would like to thank my parents, who have been supporting my love of travel and wildlife for my entire twenty-one years of life.*

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## Author and Mentor Bios

**Galina Kinsella** is a biomedical science: medical and veterinary science major from Charleston, South Carolina, graduating in May 2015 with a bachelor of science. A member of the University Honors Program, Galina embarked on her research project as part of her honors senior thesis, and also to gain experience that will help her on her career path. Galina will attend veterinary school in the fall, and is especially interested in conservation medicine. She has found that her independent research in Australia was a great asset in her applications and interviews for veterinary school. Galina gained a good deal of knowledge from her summer research. "I learned a lot about koalas, a species I knew next to nothing about before I started my grant application. I learned that patience and being flexible are incredibly important in research, as plans change constantly, especially in field research. I also learned that it is

important to develop a statistical analysis method prior to data collection," she said. During her weeks in Australia, she gained, "experience working with wildlife and withstanding the tough conditions of being out in the field." She found her time in the outback, working with other researchers, along with the friendships she made, to be unforgettable memories. Galina feels that, "this experience has made me a stronger and more independent person who is able to think on my feet."

Dr. **Andrew Conroy**, professor of applied animal science and integrated agriculture, has been with the University of New Hampshire for twenty-five years. He specializes in animal agriculture, and his teaching includes Large Animal Behavior and Handling, Forage and Grassland Management, Dairy Herd Management, CREAM (Cooperative Real Education in Agricultural Management), Dairy Selection, and Dairy Cattle Diseases, among other courses. Dr. Conroy became involved with research abroad projects after recognizing the potential for student study and research of sites he visited during his year as a Fulbright Scholar in Namibia and while on consulting trips to other African countries. He has mentored other undergraduate researchers, as well as Galina, which included helping students with capstone or thesis projects in Italy, Tanzania, Brazil, and Namibia. Encouraging his students to publish their research in *Inquiry* is yet another way in which he helps them acquire valuable skills for their future careers.

Dr. **Alistair Melzer** is an ecologist who has been working on the natural history and conservation biology of the koala since 1988, as well as on other projects related to the maintenance of natural values in human-dominated landscapes. He is an Adjunct Research Fellow in the School of Medical and Applied Sciences at Central Queensland University. Galina was appointed an honorary staff member and member of the research team, where she was a field research assistant for Dr. Melzer, while working on her SURF Abroad project. "Galina was a keen worker and fitted well with our field teams," said Dr. Melzer. "Her set of observations adds to our understanding of koala behavior."